Supporting development of the Blue Economy through use of automation and AI in hydrographic software

Innovations in hydrographic survey to meet the evolving global oceans agenda and the development of the Blue Economy

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Agenda

- Introduction to the Blue Economy
- Challenges in Hydrography and the Blue Economy
- AI and Automation in hydrography
- The future
- Conclusion

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What is the Blue Economy

- The Blue Economy refers to the sustainable use of ocean and aquatic resources for economic growth, improved livelihoods and ecosystem health
- The ocean supports many economic activities, which are growing rapidly and projected to reach at least $3 trillion by 2030 *(OECD – The Ocean Economy in 2030 (2016))*

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International Oceans Policy Context

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

There is growing awareness of the importance of our oceans and the power of marine data, with NGOs, governments and others working together to find solutions that allow us to understand and then protect our marine environments

Sustainable Development Goal 14

‘Conserve and sustainably use the oceans, seas and marine resources for sustainable development’

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Supporting Industry

- Safe navigation & trade: Maps seafloor and currents for efficient, safe shipping routes
- Sustainable fisheries: Identifies habitats for better resource management
- Offshore energy: Supports renewable energy projects (eg wind, tidal) with seabed data
- Coastal Infrastructure: Enables resilient ports and harbours for trade and tourism

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Supporting sustainability and resilience

- Environmental protection: Monitors sea level rise and ecosystems for climate adaptation
- Marine resources: Locates minerals and aquaculture sites sustainably
- Blue economy impact: Ensures economic growth aligns with ocean health

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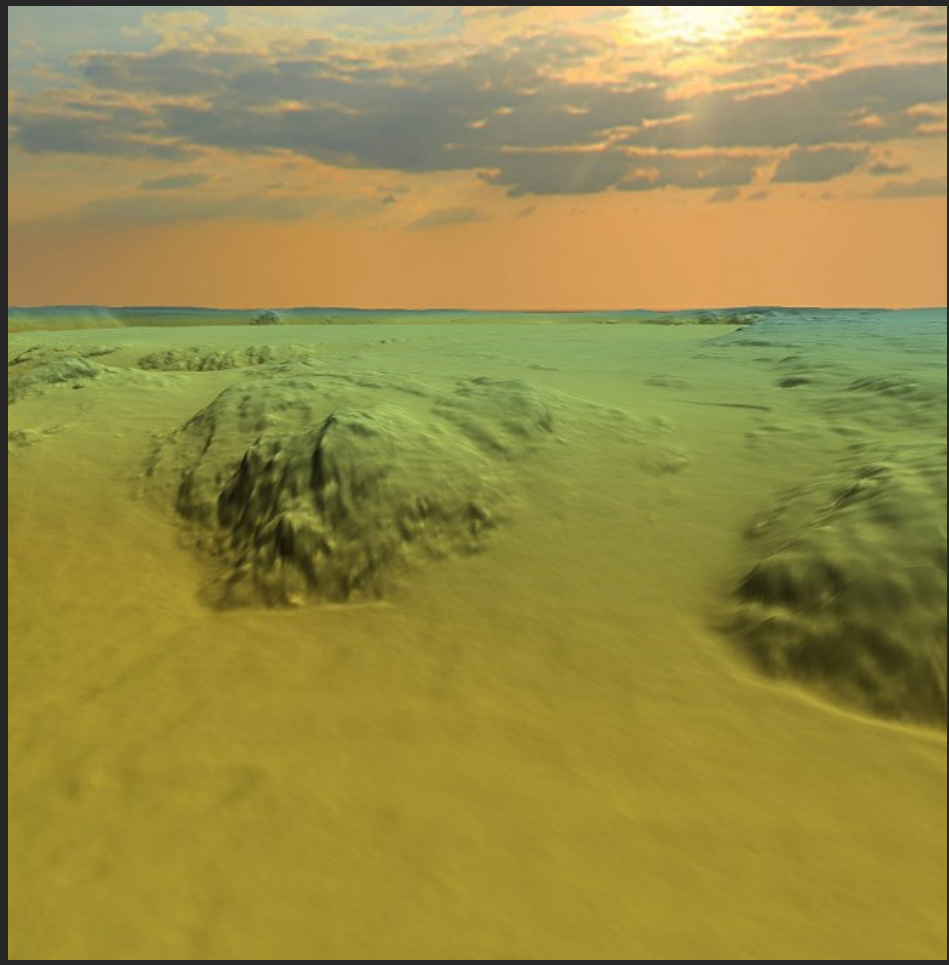
Challenges

- Technical
  - Shortage of hydrographic expertise
  - Equipment limitations
  - Environmental barriers
- Financial
  - High costs
  - Competing priorities
  - Limited external support



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Innovations in hydrographic techniques

‘Cutting-edge technology maps more ocean, faster and smarter’

- More data collection and better understanding and investment is being achieved through innovations like:
  - Uncrewed vehicles: Uncrewed surface vehicles (USVs) and underwater drones reduce costs and risks while expanding coverage
  - Multibeam echosounders: High-resolution, wide-swath mapping improves data density and speed
  - Sensor miniaturisation: Compact, efficient tools enhance deployment on diverse platforms

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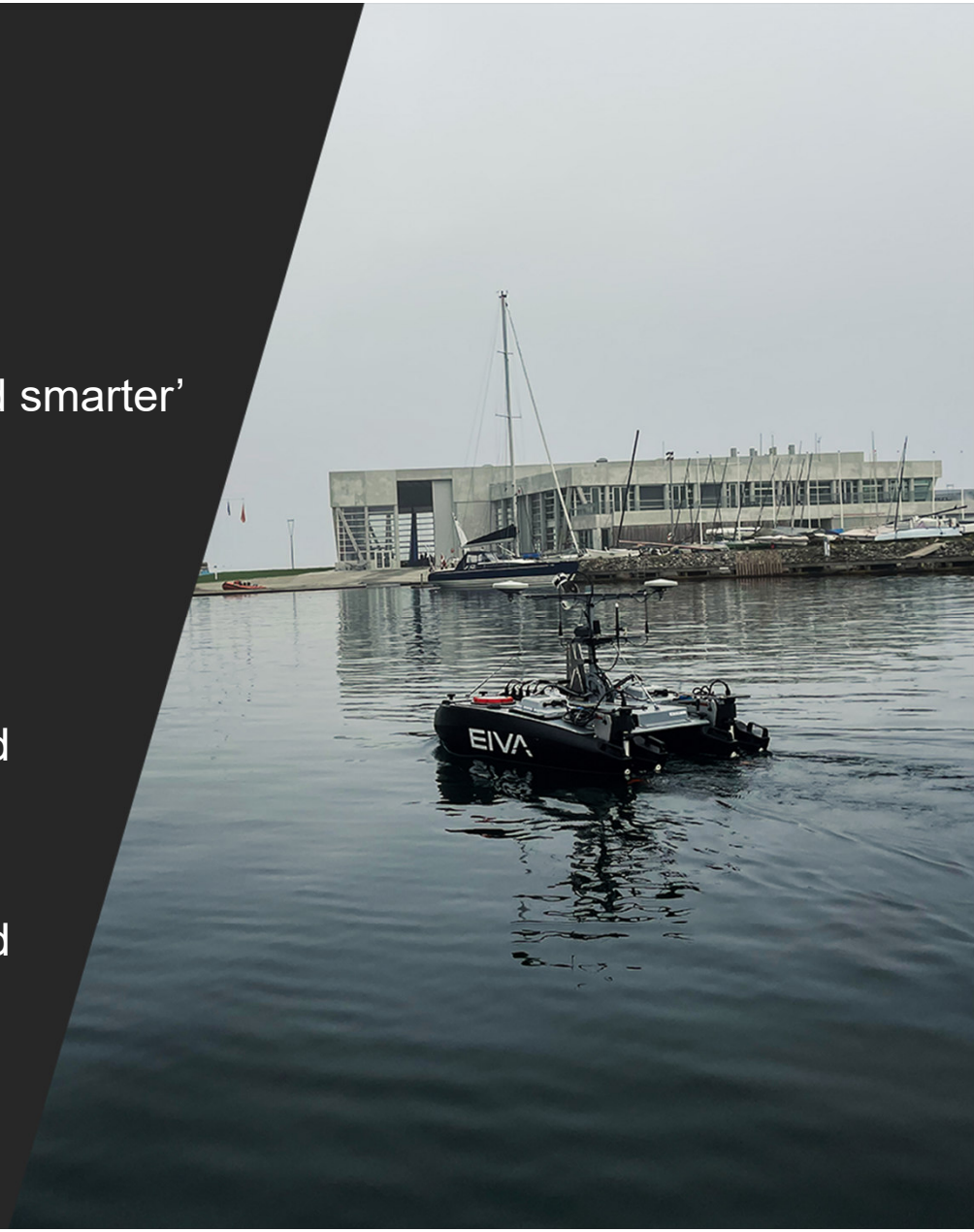

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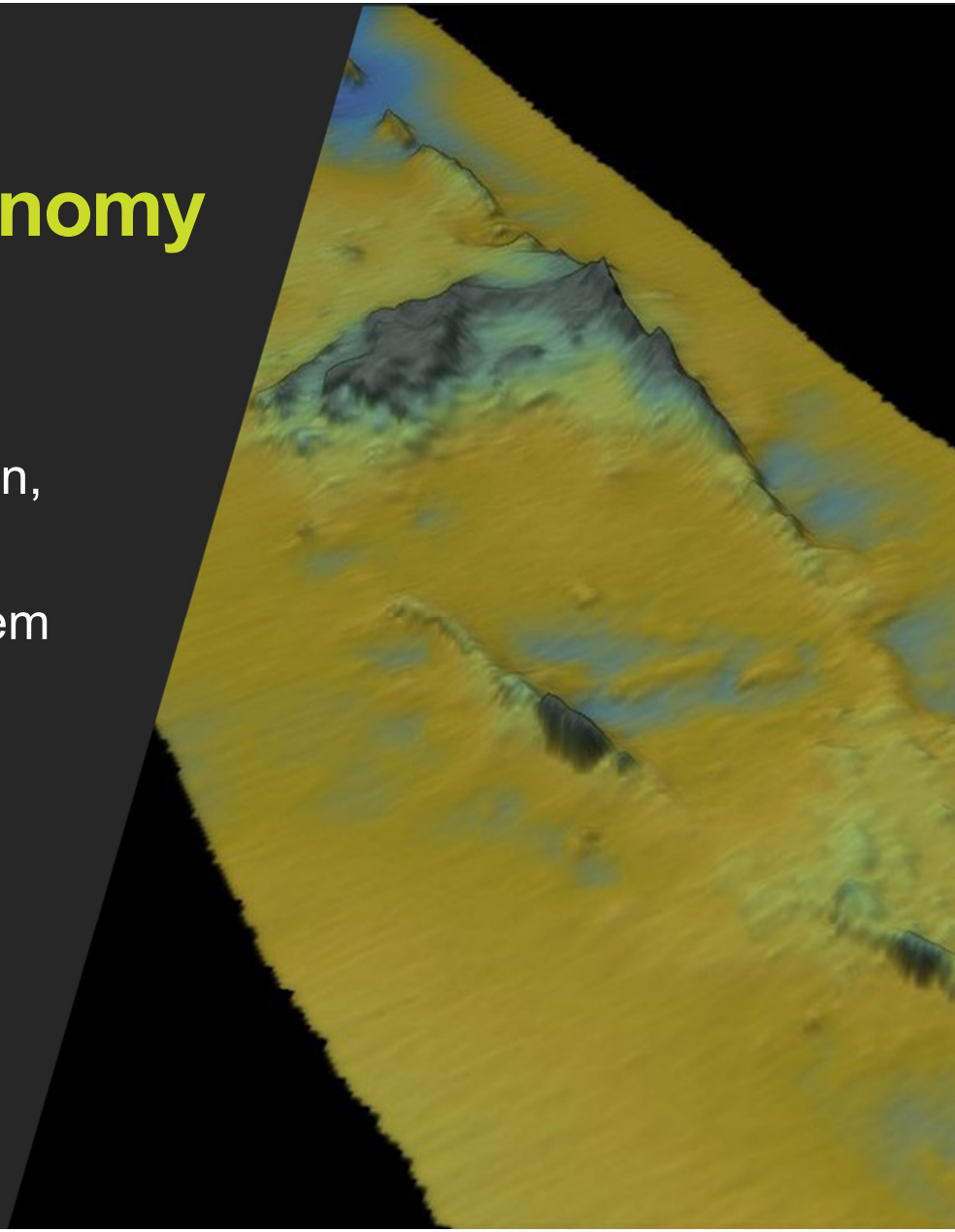
Defining Automation and Autonomy

- Automation is about making a process or task execute automatically without human intervention, following predefined rules or instructions
- Autonomy goes a step further—it implies a system can make decisions or adapt to situations independently, often without explicit human guidance
- AI amplifies both automation and autonomy in hydrographic workflows



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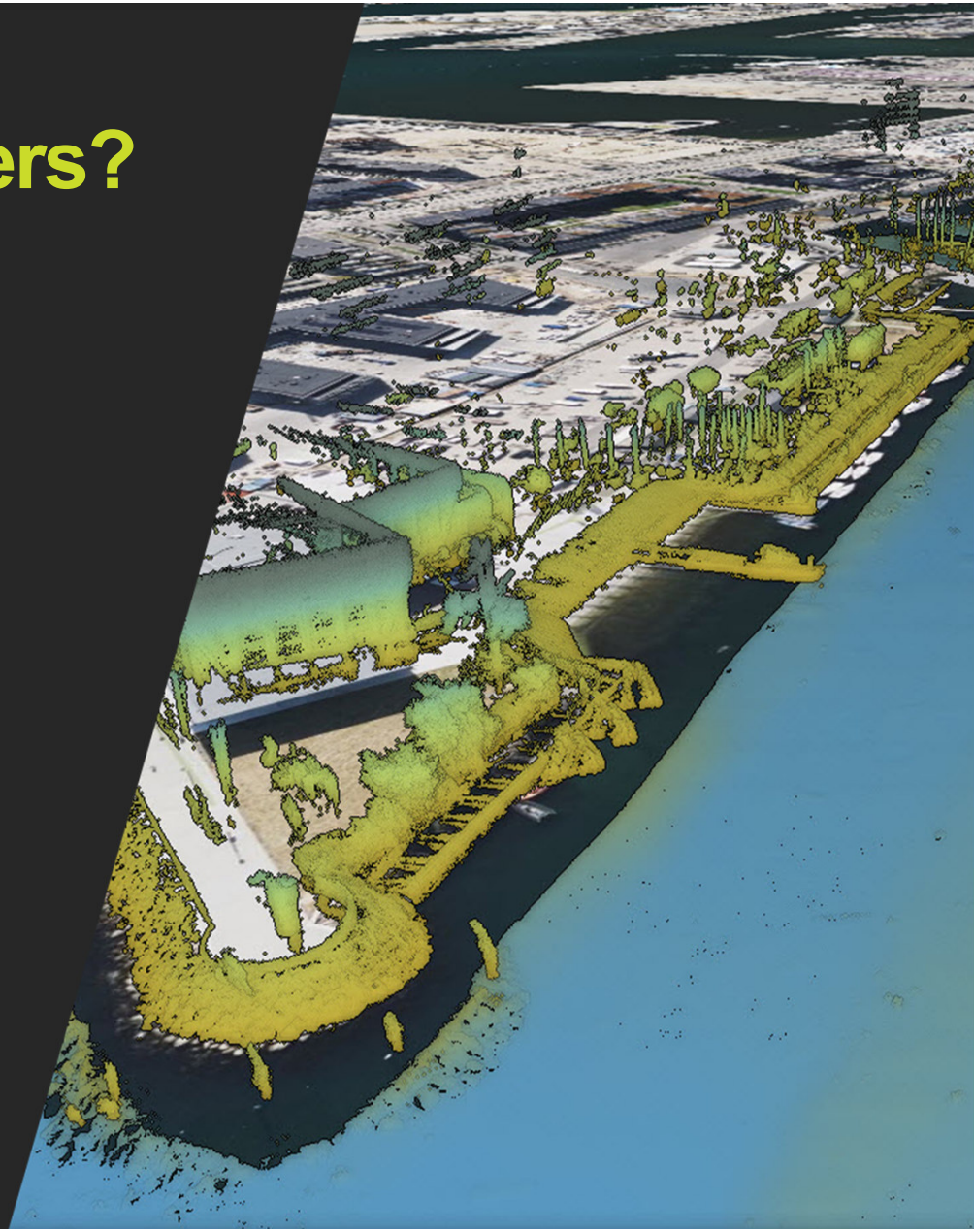
Mapping without hydrographers?

- For someone without hydrographic training – software features can shift the focus from technical mastery to task completion
- The software essentially acts as a ‘survey assistant’, reducing the process to plugging in equipment, following prompts and reviewing outputs and results
- Automation handles complex calculations (eg bathymetric gridding), while real-time visuals and guided steps build confidence in data quality



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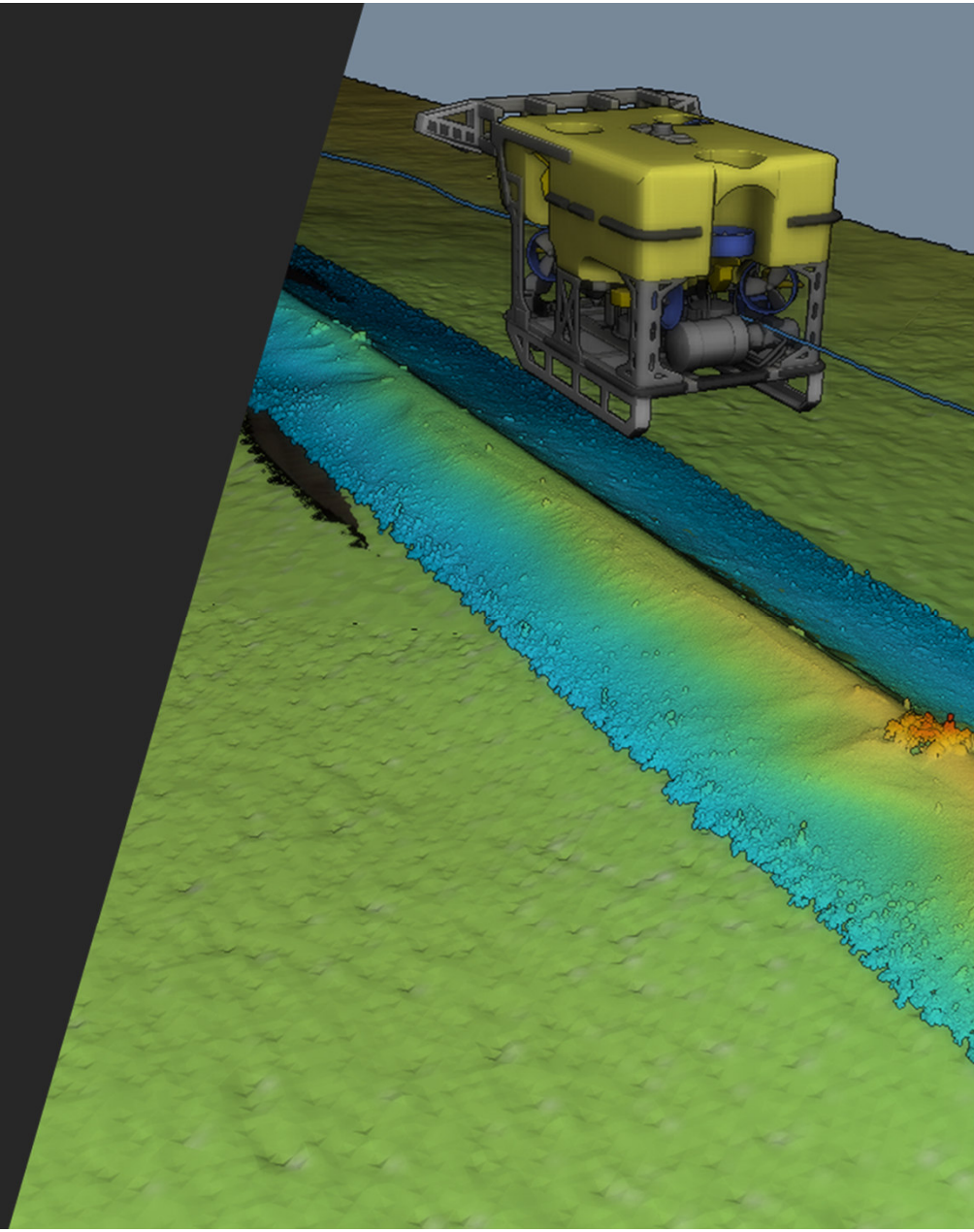
Advances in hydrographic software

‘Software turns raw data into actionable insights’

- AI and Automation: Real-time data processing and anomaly detection streamline analysis
- Cloud-based platforms: Enable global collaboration and data sharing (eg, Seabed 2030 project)
- 3D visualisation: Enhances decision-making for marine spatial planning and conservation



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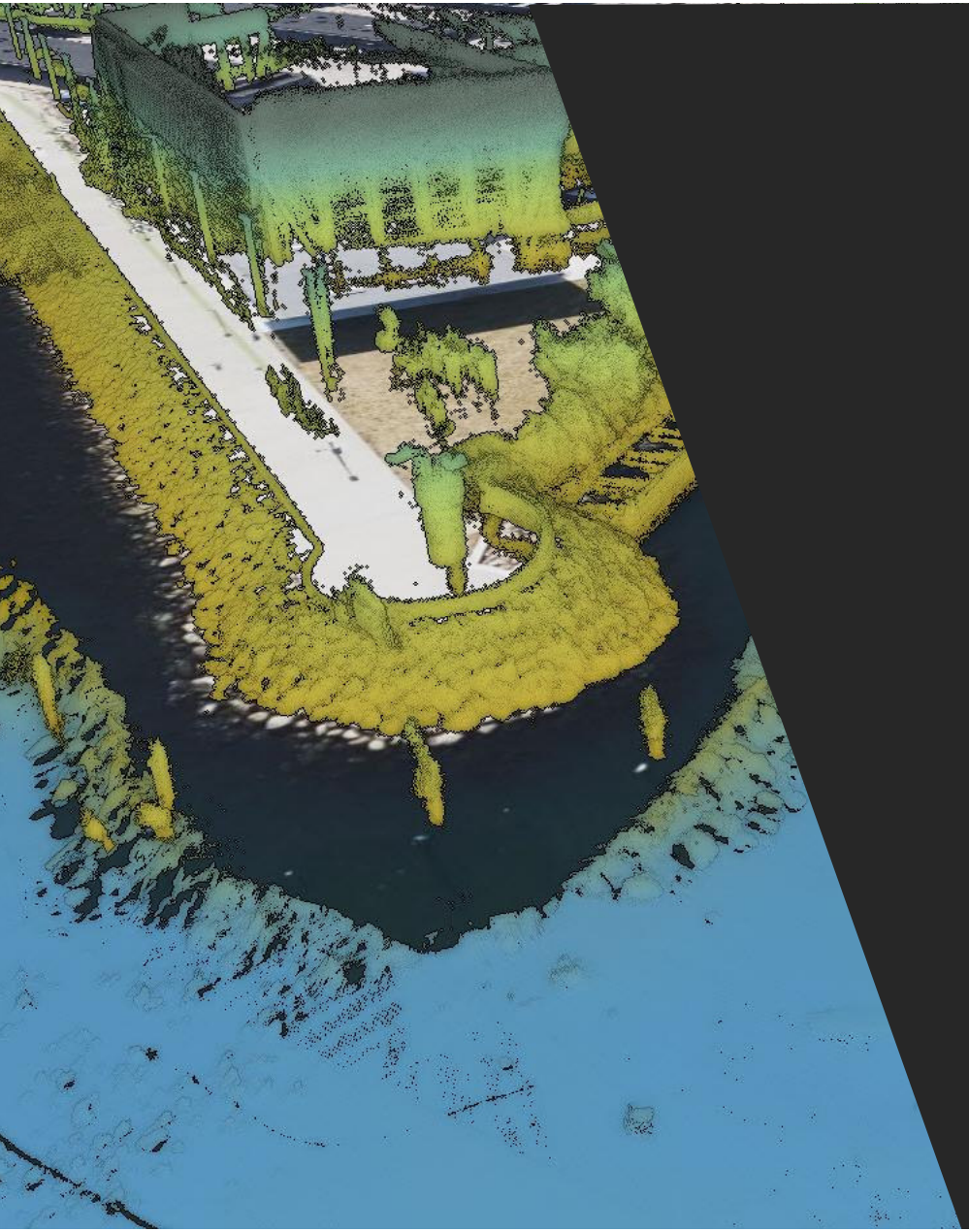

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Automation in data collection and processing

Key areas of automation

- Survey and line planning
- Data quality monitoring
- Data cleaning and filtering
- Data classification and analysis
- Report generation and visualisation

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Benefits of automation in data processing

- Time savings
  - Speed up data processing with automatic filtering, classification and QA/QC checks
  - Reduce bottlenecks in workflows by automating repetitive tasks
- Cost savings
  - Lower overall costs by reducing the need for expensive assets and by making better use of the skills of existing personnel
  - Reduce hardware usage and operational costs with streamlined processes

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How does AI enhance automation

AI is transforming hydrography by making it more efficient, accurate, and responsive to real-time conditions paving the way for safer and more effective maritime operations.

- Automated data processing
- Real-time data analysis
- Enhanced survey efficiency
- Improved data accuracy
- Predictive modeling

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Future of automation in hydrographic data processing

- Emerging trends
  - Increased adoption of AI and machine learning
  - Potential for faster real-time or near-real-time processing in field environments
  - Cloud-based storage and processing
- Long-term benefits
  - Improved data reliability and decision-making
  - Cost-effective data collection and analysis
- All of which will benefit developing countries' need for data and knowledge

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‘Hydrographic innovation is the backbone of a thriving, sustainable blue economy’

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AUTONOMOUS DATA COLLECTION